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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/464,297 12/15/99 ARONOWITZ

S 99-039

EXAMINER

IM22/0605

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ART UNIT

PAPER NUMBER

1765

3

DATE MAILED:

06/05/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.
09/464,297

Applicant(s)
Aronowitz et al.

Examiner
Charlotte A. Brown

Art Unit
1765



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Dec 15, 1999
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- *See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 2
- 18) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other: _____

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DETAILED ACTION

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1 and 4 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In line 5 of claims 1 and 4, "predetermined" is vague and indefinite.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Puchner et al. (US 6,156,620) in view of Puntambekar et al. (US 5,714,037).

Puncher discloses a process for forming a nitrogen-containing barrier region. A silicon substrate, such as single crystal silicon substrate, is provided. A thin silicon oxide liner is grown over the silicon substrate. The silicon oxide layer is exposed to a nitrogen plasma. The step of exposing the nitrogen plasma may be carried out in a conventional etching chamber at a pressure low enough to permit plasma generation. A pressure ranging about 20 milliTor (mTor) to about

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80 mTorr has been found to be satisfactory. This reads on the chamber having a pressure from about 1 millitorr to about 500 millitorr. The energy or power level of the nitrogen plasma should be sufficient to permit the nitrogen atoms to penetrate into the silicon oxide layer. The use of a 200-500 watt plasma source in combination with an rf bias power of 5-20 watts electrically coupled to the substrate support in the plasma chamber will provide a desired amount of energy to the nitrogen ions in the plasma (Column 4, lines 41-67). This reads on the applicant's limitation of exposing the oxide surface to a plasma maintained at a power level of from 250 watts to about 500 watts and maintaining a power level ranging from above zero up to about 100 watts.

Although Puncher does not teach a method whereby a fixed thickness of silicon oxide will be removed from the oxide surface with the oxide thickness removed dependent upon the power level of the bias on the electrode in the etching chamber, he does teach that the same process conditions for the maintaining the rf bias power and the power level for exposing the semiconductor substrate to a nitrogen plasma. It is the examiner's position that a fixed thickness of silicon oxide will be removed from the oxide surface under these processing conditions.

Unlike the claimed invention, Puncher does not disclose a method in which an electrode is used as a substrate support.

Puntambekar discloses a method for improving adhesion between films. A semiconductor substrate is provided. A silicon dioxide film is treated with a nitrogen plasma in an reactive ion etching mode in a plasma etcher. The semiconductor substrate is placed on a lower electrode, a substrate support.

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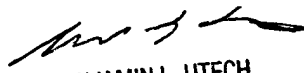
It is the Examiner's position that a person having ordinary skill in the art would have found it obvious to modify Puncher by using an electrode as a substrate support as taught by Puntambeker because Puncher is not particular about the type of substrate support used in his process and therefore any type of substrate support would have been anticipated to produce an expected result.

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. (US 6,136,211)

6. Any inquiry concerning this communication from the Examiner should be directed to Charlotte A. Brown whose telephone number is (703) 305-0727.

CAB

June 1, 2001


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